



Restoration efforts can re-establish ecosystems function following degradation © IUCN Michelle Laurie

NATURAL SOLUTIONS



Protected areas helping people deal with desertification and drought

Drylands occupy approximately 40% of Earth's land area and are home to more than two billion people. These habitats are important carbon stores and harbour many endemic species uniquely adapted to arid conditions. Habitat conversion and unsustainable land management are leading to degradation and desertification. Fortunately, dryland protected areas can diminish land degradation caused by human activities and climate change and buffer communities at risk.

Desertification occurs when dryland habitats become degraded and eroded through deforestation, overgrazing, poor irrigation practices and other unsustainable land and water management. Drylands on every continent are losing vegetation cover, fertile top soil and productivity. As food and water supplies are threatened, communities suffer, which can cause famine, mass migration and economic losses. According to the United Nations Convention to Combat Desertification (UNCCD), 70% of the world's drylands outside deserts are already degraded. Over 250 million people are directly affected by desertification and one billion more are at risk.

Two thirds of Africa is desert or drylands; with extensive areas used for agriculture, almost three quarters of agricultural drylands are degraded. By 2020, between 75 million and 250 million people in Africa are expected to suffer increased water shortages due to climate change; in some countries yields from rain-fed agriculture could be reduced by up to 50%.

Land degradation and desertification are global problems

Almost one third of Asia consists of arid or semi-arid habitats. A quarter of all Latin America is desert or drylands ranging from deserts along the Pacific coast from southern Ecuador to Chile, to the high altitude dry plains in the Andes. Most of Mexico and north-east Brazil is arid. Erosion and water shortages are intensifying in Jamaica, Haiti, Dominican Republic and Cuba. From the Caribbean to the Pacific, land degradation in small island areas has severe and lasting consequences.

Nationally-designated protected areas currently cover 9% of the world's drylands

Primarily designated for biodiversity conservation, protected areas also provide a range of ecosystem goods and services important to global environment and human welfare. By maintaining functioning ecosystems, they are important natural solutions in combatting desertification.



Communities living in dryland ecosystems are especially vulnerable to land degradation and climate change © IUCN Danièle Perrot-Maitre

Dryland protected areas provide essential water supplies

By definition, drylands have limited freshwater supplies with highly variable and erratic rainfall. In the past people adapted to dramatic climatic events by nomadic herding and shifting agriculture. Such responses have become less practicable with changing economic and political realities, more settled communities, and conversion of natural habitats for large scale agriculture.

Drought and desertification are associated with the lowering of water levels in rivers, lakes and underground reservoirs. Natural vegetation and wetlands in protected areas regulate water flows and help reduce flash flooding from heavy rains after drought. Dryland protected areas play a key role in protecting essential water supplies for domestic and agricultural needs. In Mongolia, for instance, most of the major rivers arise in protected northern forested steppe. Similarly dryland protected areas in watersheds protect water supplies of major cities such as Port au Prince, Haiti and Karachi, Pakistan.

Protected areas help address and cope with desertification as they:

- Protect watersheds, water sources and wetlands
- Maintain natural habitats and stabilise dunes to stop the advance of deserts
- Restore habitats, including reforestation and grasslands recovery
- Serve as a safety net in times of drought, providing emergency food, water and grazing for livestock
- Enhance grassland management practices for sustainable grazing and improved fire management
- Maintain healthy ecosystems and pilot management practices that control and limit invasive alien species
- Protect ecosystems with high carbon storage and rich biodiversity
- Establish community conservation areas or other management schemes which improve land and water management in biodiversity-rich areas
- Conserve native biodiversity

Protected areas are a viable option to reduce risk

Drought may be locally uncontrollable. Desertification and land degradation, however, can be reduced by improved land management practices, thereby increasing resilience and resistance to the impacts of drought.

With more erratic rainfall and increasing frequency of droughts, as well as global increases of population, water supplies are becoming scarcer and more unpredictable. Watershed protection in dryland protected areas can reduce the risks of large scale disasters such as the famine in Somalia.

Protected areas, because of their existing policy framework and recognized role in providing crucial ecosystem services, can be a valuable tool in national and local strategies to maintain resilient ecosystems, address desertification and reduce vulnerability to disaster. This role will become more critical as countries struggle to deal with climate change and to meet their obligations under international conventions, including the UNCCD and the Convention on Biological Diversity (CBD). Specific recognition of these natural solutions is essential in both policy and practice.



Islands are especially vulnerable to degradation, which is often worsened by the spread of invasive alien species. On Robinson Crusoe Island, Chile, park staff observe degraded pastoral land © IUCN Jim Thorsell

Dryland protected areas ensure food security and livelihoods

Important food crops originated in drylands: ancestors of wheat and barley originated in south-west Asia; maize, squashes and beans in Mexico and wild potatoes in Peru. Today protected areas maintain populations of crop wild relatives, important for crop breeding. Quechua communities in the Pisac, Cusco area of Peru established the Potato Park as a community-based, agrobiodiversity-focused conservation area where potatoes have been cultivated by Andean farmers for over 7000 years. The Sierra de Manantlan Protected Area in Mexico protects populations of wild maize (*Zea diploperennis*) which increases disease resistance when crossed with cultivated maize (*Zea mays*). Similarly the Karacadağ Mountain protected area in south-east Turkey was selected in part for its role in the domestication of wild einkorn (*Triticum boeoticum*). These conserved genetic resources increase the adaptive capacity of communities to deal with low rainfall periods by providing a variety of drought resistant plants.

Over 2 billion people depend on functioning drylands for their survival

Dryland protected areas alleviate poverty

Many dryland protected areas are zoned for multiple uses and work with local communities to improve their welfare through programmes which aim to reconcile biodiversity conservation and human needs.

- In India, eco-development programmes around Ranthambore Tiger Reserve in Rajasthan have combined

conservation and famine relief funds to restore ancient step wells, providing new water supplies for communities, livestock and wildlife.

- In Masai Mara National Park in Kenya, communities are working with the Kenya Wildlife Service to remove the invasive alien plant feverfew (*Parthenium hysterophorus*) which is replacing and reducing fodder grasses available to wildlife and livestock.
- Research in the Chimborazo Faunal Production Reserve, Ecuador has shown the ecological benefits of encouraging the husbandry of native camelids instead of cattle and horses, therefore improving pasture conditions.

Dryland protected areas combat land degradation

Expanding cultivation, overstocking and overgrazing are key contributors to land degradation. Rising populations of both people and livestock have led to overuse of marginal habitats and subsequent degradation. This is often worsened by the spread of invasive alien species, which cause a reduction of crop yields, degradation of pasture, and choking of irrigation canals, thus reducing the lifespan of dams and reservoirs. More than half the staple crops planted in developing countries are destroyed routinely by invasive species both pre-and post harvest. Increasing globalization, trade, and even famine relief efforts have contributed to the spread of invasive species. Climate change will further exacerbate their spread in vulnerable ecosystems, therefore contributing to social instability and economic hardship.

Protected areas can help to address land degradation by

zoning for appropriate land uses. This can include implementing sustainable grazing, and managing and maintaining healthy ecosystems that protect water sources and slow the spread of invasive species. Protected areas can be established through a variety of governance and management regimes, from state-run reserves to indigenous peoples' territories and community conservation areas or private conservancies. Community conservancies in Namibia benefit from wildlife conservation and ecotourism on lands that are marginal for agriculture. Similarly indigenous communities in the Kaa-Iya National Park in Bolivia and surrounding territories co-manage a large area of semi-arid lands zoned according to conservation and community needs, including strict protection, limited extraction and intensive use. Other examples include:

- **Protecting endangered steppe habitat in Kazakhstan:** UNDP/GEF is funding a landscape level conservation system in threatened steppe habitat. The project is linking an expanded protected area network with other compatible land uses. In 2011, the 88,968 ha Buiratau state national park was established in the transition zone between moderately arid and dry steppes: it harbours over 450 vascular plant species and many endangered animals.
- **Community agreements to reduce grazing in Jordan:** Dana Nature Reserve in central Jordan is in an area where traditional livestock grazing had radically altered vegetation patterns and increased soil erosion. Negotiations with farmers resulted in an agreement to halve the numbers of goats, leading to spectacular increases in vegetation cover and associated wildlife. Alternative livelihoods are being encouraged including ecotourism, jewellery making and homemade herbal and fruit products.
- **Reducing the impacts of climate change in Mongolia:** Hövsgöl National Park in northern Mongolia is at the southern edge of the taiga forest. Uncontrolled livestock grazing and fuel wood gathering have caused the forest to retreat. Increasing soil exposure and ground temperatures have accelerated permafrost melt. To mitigate these effects, herders have changed to rotational grazing and improved range management, thus helping protect Mongolia's water resources, biodiversity, and natural ecosystems.

Grasslands constitute about 34% of the global stock of terrestrial carbon

- **Increasing carbon storage in arid areas of China:** A pastoral development project in China is restoring biodiversity and increasing the productivity of grassland resources in the protected areas of Tien Shan, Altai Shan, and Qilian Shan. Spring and summer grazing periods are shortened and delayed in high mountain grasslands. Reducing grazing pressure is expected to lead to increased species diversity, greater biomass productivity, and improved grazing conditions for wild ungulates as well as livestock. It will also increase the amount of carbon entering the soil and reduce soil loss due to overgrazing.
- **Fencing against overgrazing and desertification in Kuwait:** Land degradation, over-grazing and use of off-road vehicles have led to a rapid increase in soil erosion, dune formation and dust storms. In addition, large areas remain damaged following the first Gulf War, including from the deposition of "tarcrete", which has prevented re-vegetation. Protection, fencing against cattle and active vegetation restoration have led to important biodiversity benefits and stabilisation of desert vegetation in heavily damaged areas.
- **Working for Water in South Africa:** Invasive alien plants are estimated to affect 10 million hectares (8.28%) of South Africa with significant ecological and economic costs. With high evapo-transpiration rates, invasive trees are an immense burden to already water-scarce regions and reduce the amount of water available to reservoirs. The Working for Water Programme has an annual government budget exceeding \$100 million. It provides training for previously unemployed and marginalized communities to clear invasives in national parks in the Cape Peninsula, Baviaanskloof and Drakensberg mountains, major water providers for the cities of Cape Town, Johannesburg, previously unemployed and marginalized communities to clear invasives in national parks in the Cape Peninsula, Baviaanskloof and Drakensberg mountains, major water providers for the cities of Cape Town, Port Elizabeth and Johannesburg.



Maintaining livestock at sustainable grazing levels helps conserve grassland biodiversity and maintain ecosystem productivity © IUCN Imène Meliane